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Tuesday, December 27, 2005

The security and productivity of farms

Perhaps the two most important factors contributing to a neolithic, ancient, or medieval civilization were the productivity and security of farmland. Over these times (almost all of recorded history) productivity and security (largely, but by no means entirely, involving warfare techniques and organization) were probably the two main factors determining the ownership (or more generally control) of farmland and thus the structure of an agriculturally dominated society.

Which of these two factors were more important? Many traditional historians take it for granted that military organization (often determined by military technology) determined social structure as well as the success of a society. Thus, for example, the theory that the stirrup gave rise to feudalism. Some other historians or scientists who study history take it for granted that crop productivity, primarily determined by ecology and technology, was more important to the success of a civilization or to determining its political, legal, and economic institutions.

Neither view is correct. Farm productivity and farm security interact, and institutions are at least as important to determining that productivity and security as the reverse.

A few historians have started analyzing the interaction between crop productivity and security in a variety of detailed ways, an approach I think may shed quite a bit of light on history.

One common strategy of ancient warfare was to "devastate" enemy crops. Historian and viticulturalist Victor Davis Hanson has studied the vines, olive trees, and some grain varieties grown in ancient Greece and has shown that they could often withstand intentional destruction (burning, chopping, digging up, etc.) rather well. I further suspect that plants in most places and times were bred, not merely for their nutritional content, and not merely to withstand weeds and animal pests, but to withstand such assaults from human pests as well.

Furthermore, I hypothesize that the pattern of control or ownership of land, and thus property law (and political structure in general) will vary depending upon the interaction of agricultural productivity and security, and vice versa.

To flesh out this theory I will make some corollary "geostrategic" hypotheses about neolithic, ancient, classical, and medieval warfare:

* There are some economies of scale in protecting farmland. An obvious economy of scale is that the area (a good proxy measure for value) of farmland increases as the square of the length of boundary that must be guarded.

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Nick Szabo

"A premier thinker about history, law and economics, and the lessons they have for security." -- Adam Shostack, Emergent Chaos

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* There are some diseconomies of scale in protecting farmland. An important diseconomy of scale is that it becomes more difficult to coordinate ever larger armies (the knowledge problem familiar to Austrian economists) and to coordinate the tax collection needed to fund those armies.

* There is a tension between the optimal size of a farm for the application of organizational labor and technology and the optimal size for military protection. If security needs become too great, the two can become mismatched and farm productivity will fall. If this is not to occur some military coordination between landowners is needed (this may be feudal, or democratic/agrarian as in the classic Greek polis, or a wide variety of other kinds of coordination including the modern state).

* Geographic features can help protect farmland, allowing its size and organization to be optimized for productivity. Which geographic features are important depends on the scale on which farmland is defended. During many eras of history (from large-scale feudal coordination to the state) such coordination has occurred on a large scale. Thus, it may be no coincidence that two large islands which have been largely or entirely protected from invasion for hundreds of years, Japan and Britain, also had among the highest agricultural productivities per acre during that period as well as the greatest cultivation of even marginal arable lands. Italy's situation is similar being protected on one side by the Alps and three other sides by water. Italy and Japan, though often divided politically during this era, are long and thin, making disputed internal boundaries shorter. In some areas (such as the Low Countries) inhabitants went to great lengths to create water barriers between themselves and invading armies. Contrariwise, this theory predicts agricultural productivity will be lowest in unprotected continental regions. Indeed, interior continental regions easily reached by horse tended to be given over to much less productive nomadic grazing. Security constraints were probably what prevented any sort of crop from being grown.

Some of the inspiration for this theory comes from Adam Smith, in Book 3 of The Wealth of Nations. Smith pointed out that there was a large mismatch between land ownership patterns that provided the best incentives to productively use the land and laws derived from feudal protection needs. Under English law there were a variety of kinds of land ownership, called "estates." Smith advocated straight ownership called "fee simple" that allowed land to be divided among children, bought and sold, and used as collateral. The two now curious but formerly common kinds of estates Smith observed and criticized were "primogeniture," in which land could not be divided among children but had to be devised to the oldest male, and "fee tail," or restraints against transferring the property or using it as collateral. In the Middle Ages land ownership was bundled with the ability to protect the land. The law thus prevented foolish heirs from dividing up their land into portions too small to protected. These restraints also protected the tenants who actually worked the land.

Smith, living on an island well protected by the navy of a single state, observed that England was moving away from that kind of ownership and advocated getting rid of it altogether, pointing out its economic wastefulness. As evidence Smith cited large tracts of poorly cultivated or entirely uncultivated land in farms still under those feudal property law constraints. Furthermore, we have seen the importance of the ability to use land as collateral. Collateralization of land probably ocurred first on a large scale in late medieval Italy. This may be due to its greater adherence to the traditions of Roman law (in which land was divided equally among children and was freely transferable) as well as its relatively secure geography.

The crucial role of security for the history of farming may also shed light on the birth of agricultural in the first place. Hunter-gatherers were very knowledgeable about plants and animals, far more than the typical modern. It would not have taken a genius -- and there were many, as their brains were as large as ours -- to figure out that you can plant a seed into the ground and it will grow. There must have been, rather, some severe institutional constraints that prevented agriculture from arising in the first place. The basic problem is that somebody has to protect that seedling for several months from enemies, and then has to harvest it before the enemy (or simply a envious neighbor) does. Security and allocation of property rights between providers of security and providers of farm labor were the intractable problems that took vast amounts of trial and error as well as genius to solve in order for agriculture to take root.

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Posted by Nick Szabo at 11:41 AM

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10 comments:

David Mercer said...

I think that the main "severe institutional restraint" was the fact that the largest human institution in pre-agricultural times was the tribe, which only got up to a few hundred people before it fissioned due to the area of land that had to be hunted and gathered.

11:26 PM

ChristopherA said...

There is a tension between the optimal size of a farm for the application of organizational labor and technology and the optimal size for military protection.

This is of particular interest to me and my thoughts regarding the dunbar number. If you look in the comments to my original Dunbar Number post, you'll note a comment:

Marvin Harris, noted anthropologist, says in his book "Our Kind" (isbn:0060919906) that you can find no cases of larger groups forming except when there is both direct military power and no place to else to go. Let me reemphasize this: In no case in history can we find groups that voluntarily formed that were significantly larger than Dunbar's number. Larger groups formed only when agricultural communities created food, that food was controlled by a chief who had armed guards/police, and it was impossible to splinter off into a new tribe because there was no other life-sustainining land to go to.

Also one of the particular issues of Dunbar Number is the large amount of time that larger groups require "grooming". In a farming environment this means working together, eating together, and celebrating together.

Thus with your observation about the border perimeter vs farm area, the tension between farmland and farmland security makes for attempting larger groups and thus requiring more grooming time, and thus potentially more of the beginnings of "society" then what a hunter/gatherer tribe requires.

12:25 AM

Serveto said...

Off Topic

As a note on your collateralization of land post:

Several people that I spoke to in China told me that they do not own their homes permanently, as in a fee simple. Rather, they told me that the government only gives them a 35 or a 70 year lease on the property.

Assuming that there is no shortage of housing, I presume this turns real property into a depreciating asset similar to a car.

How does this affect using real property as collateral for other ventures?

In lieu of borrowing against their homes to begin businesses, most people I spoke to told me that they borrowed money from various family members.

1:47 AM

Nick Szabo said...

David Mercer and Christopher Allen: I think you are definitely onto something. A good contemporary example are the Hutterian communes that fission after they reach between 100-200 people.

However, I don't know if I agree with Marvin Harris. In modern times people voluntarily join corporations with hundreds of thousands of employees, so large organization certainly does not require internal or immediate coercion. If instead Harris is saying that large organizations require property rights which in turn require police powers, he may be more accurate, but that analysis applies only under certain conditions and not others.

Per David Mercer's comment, tribes, clans, and even individual families could and did farm land. The growing part is easy, the security not so easy. For most of history military organizations were the largest organizations, and almost surely the first organizations to exceed the size of tribes. This due in turn to the economies of scale in securing farmland.

While property rights always require some degree of security, that security doesn't necessarily come in the form of police powers. My more general thesis is that the productivity and security characteristics of a form of wealth determine optimal property rights structure. Farmland is the dominant form of wealth during almost all of written history, and thus has played a dominant role in shaping our current legal and political forms, but these aren't the only forms possible.

In the case of fixed property such as farmland and oil fields the need for military/police powers is extensive. Since farmlands have been the dominant form of wealth until quite recently large organizations have never been too far removed from the military organizations needed to secure that wealth. However, such an association is not necessarily going to occur where other kinds of property predominate.

Mike Gomez: I don't know how well land can be collateralized in the China at present. However, if the periodic payments on the lease are less than the amortized value of the land and there are reliable records about all this, the lease is an asset which one could, if allowed by law and the terms of the lease, buy or sell or use as collateral. This is common for long-term commercial leases developed countries.

Indeed, the "fee simple" by which land is owned in British Commonwealth countries is in its origin just a perpetual feudal lease from the Crown. (In contrast to "alloidal" absolute ownership common before the Norman Conquest). The Magna Carta, and some subsequent developments by which our political rights evolved, were viewed at the time as a negotiation between the Crown's immediate tenants (barons) and the Crown governing terms of such leases (including also the more common inalienable "fee tail"). Under such a regime property taxes were equivalent to rent, and indeed were often paid up from landlord to super-landlord to the ultimate landlord, the Crown. Under this regime the Crown has alloidal title which gives it police powers on its property ("the realm"). In feudal times sub-lords also had some police powers. In exchange for these rents and police powers, by the terms of leases such as Magna Carta the Crown had to give tenants some rights.

Occasionally private companies were given or usurped alloidal rights which included police powers (such as the East India Company, the Congo Independent State, Anglo-Belgian Indian Rubber Co., and so on). These companies used police powers to extract "rent" from their subjects, leading to rather severe abuses for the former inhabitants or owners of those lands. The victims did not participate in the negotiation of leases, but had leases forced upon them by conquest.
Of course, governments have perpetrated abuses as bad or worse. The general lesson is that, whether "public" or "private," there need to be severe controls put on the exercise of police powers.

9:13 AM

J Thomas said...

Very nice idea. Very clearly stated.

With about half a dozen more like this you could give Jared Diamond a run for his money. If you could stand being in that line of business.

7:20 AM

Paul Dietz said...

Security can also affect the type of crop grown. Root crops (for example, potatoes) are more difficult for maurauders to confiscate.

5:22 AM

Anonymous said...

...and what will be the result of things like adminstrative law towards land use and restrictions?
The ever-changing sea of enviornmental laws and misspent efforts to control the non-stewarts-of ownership?

6:00 PM

Anonymous said...

I recall Jared Diamond asking a hunter-gatherer why he didn't farm, and he replied, "Why farm when the world is full of monongo nuts?" There is a lot of evidence that health drops drastically when people move from foraging to agriculture. My understanding is that it happens only when forced by overpopulation, the main advantage of agriculture being that it can support a far higher population per a given area of land. But perhaps I am wrong about this.

There does seem to be a strong connection between agriculture and warfare. As Andrew Bard Schmookler explains in The Parable of the Tribes: the Problem of Power in Social Evolution, with agriculture you get regular warfare (and not just raiding), which in turn leads to centralized political systems which in turn tend to produce class-stratified society in which the bulk of the wealth, which mostly comes from the land, is owned by the governing elite--either through direct ownership, rents, or taxes.

I think you are adding another piece of the puzzle, namely how agriculture is effected by its security requirements.

It is amazing to me how we have all been through thousands of years of all of this, but only now are we beginning to get some overall understanding of what has been propelling history.

Les Brunswick

7:27 PM

Bill Harshaw said...

Surely any rational raider is going to bypass crops in the field in favor of confiscating the harvested produce and the livestock. The problem of security against raiders is one of protecting the farmstead against raiders, whether the Norse or the native Americans, not the land.

3:07 PM

Anonymous said...

Great resource. keep it up!!Thanks a lot for interesting discussion, I found a lot of useful information!With the best regards!

Frank

4:37 AM

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